IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Before the Board of Patent Appeals and Interferences

In re the Application

Inventor	:	Childs, M. J.
Application No.	:	10/523,381
Filed	:	November 21, 2005
For	:	ELECTROLUMINESCENT DISPLAY DEVICE TO DISPLAY LOW BRIGHTNESS UNIFORMLY

APPEAL BRIEF

On Appeal from Group Art Unit 2629

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Date: October 1, 2010

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I. REAL PARTY IN INTEREST

The real party in interest is the assignee of the present application, U.S. Philips Corporation, and not the party named in the above caption.

II. RELATED APPEALS AND INTERFERENCES

With regard to identifying by number and filing date all other appeals or interferences known to Appellant that will directly effect or be directly affected by or have a bearing on the Board's decision in this matter, Appellant is not aware of any such appeals or interferences.

III. STATUS OF CLAIMS

Claims 1, 3-8 and 10-22 have been presented for examination. All of these claims are pending, stand finally rejected, and form the subject matter of the present appeal. Claims 2 and 9 had been removed from consideration and not included in the present appeal.

IV. STATUS OF AMENDMENTS

In response to the Final Office Action, having a mailing date of May 6, 2010, Appellant timely submitted arguments to overcome the reasons for rejecting the claims. Amendments were made to the claims. In reply, an Advisory Action, having a mailing date of July 15, 2010, was entered into the record. The Advisory Action stated that the amendments to the claims raised new issues and maintained the rejection of the claims for reasons similar to those asserted in the Final Office Action. The Advisory Action further stated that for purposes of Appeal the amendments to the claims would not be entered. A copy of the claims, as currently of record, is presented herein.

A Notice of Appeal was timely filed in response to the Advisory Action and this Appeal Brief is being timely filed, with appropriate fee, within the period of response from the date of the Notice of Appeal.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention is expressed primarily in independent claims 1, 7, and 8 which represent an electroluminescent (EL) device, a portable device including the EL device of claim 1 and a method for driving an electroluminescent device.

Independent claim 1 recites a display device comprising an array of display pixels (1, see Figure 1), each display pixel (1) comprising an EL display element (2) and a current source circuit (16, see Figure 2) for driving a current through the EL display element (2) in dependence on a data voltage, the display device (1) being operable in at least a first and a second phase (30, 32) within each frame period (see Fig. 3), the first phase (30) having a first duration and during which a first one of a first plurality of drive currents (31) can be driven through the EL display element, and the second phase (32) having a second duration, different to the first duration (30), and during which a second one of a second plurality of drive currents (33) can be driven through the EL display element, wherein the first (31) and second (33) ones of the respective pluralities of drive currents are independently selectable and at least one of the first (31) and second (33) pluralities of drive currents include more than two drive current levels, and wherein the first plurality of drive currents (31) comprises a number n of drive current levels, including a zero drive level, and wherein a duration of one phase is approximately n times a duration of the other phase, wherein during said first phase (30) each of the pixel display elements is sequential driven for said first duration with a corresponding one of said first plurality of drive currents (31) and during said second phase (32) each of the pixel display elements is sequential driven for said second duration with a corresponding one of said second plurality of drive currents(33) associated with said second phase.

Independent claim 7, as shown in Figure 9, recites a portable device (40) including the EL device of claim 1 (42).

Independent claim 8 recites a method of driving an electroluminescent (EL) display device comprising an array of display pixels(1), each display pixel comprising an EL display element(2) and a current source circuit (16) for driving a current through the EL display voltage in dependence on a data voltage, the method comprising the acts of: in a first phase (30, Figure 3) having a first duration, sequentially driving each of said display pixels with a corresponding one of a first plurality of drive currents (31) for said first duration; (see , Figures 3-8) and in a second phase (32) having a second duration, different to the first duration, sequentially driving each of said display pixels (2) with a corresponding one of a second plurality of drive currents (33) for said second duration, wherein the first (31) and second (33) ones of the plurality of drive currents are selected to provide a desired combined EL display element output, and at least one of the first and second pluralities of drive currents includes more than two drive current levels, and wherein the plurality of drive currents comprises a number n of drive levels, and wherein a duration of one phase (30,32) is approximately n times a duration of the other phase (32, 30).

The remaining claims, which depend from respective independent claims, express further aspects of the invention.

VI. GROUNDS FOR REJECTION TO BE REVIEWED ON APPEAL

The issues in the present matter are whether:

(1) Claims 1, 3-6, 8 and 10-22 are unpatentable, under 35 USC 103(a), over Inukai (USP no. 6,680,577) in view of Hirane (USP no. 4,967,192); and

(2) Claim 7 is unpatentable, under 35 USC 103(a), over Inukai and Hirane and further in view of Hack (USPPA 2002/0030647).

VII. ARGUMENT

I. Rejection of claims 1, 3-6, 8 and 11-22 under 35 USC §103

The rejection of claims 1, 3-6, 8 and 11-22 as being rendered obvious and unpatentable under 35 USC §103(a) by the combination of Inukai in view of Hirane is in error because the combination of the references fails to disclose a material element recited therein.

Summary of the Rejection of the Claims

The Final Office Action, states with regard to claim 1, for example, that Inukai discloses an EL display device 101 including an array of display pixels 104 where each pixel includes an EL display element 109 and a current source circuit including a transistor 108 and a capacitor 112 for driving current through the EL display element wherein the current through the EL display element 109 depends on a data voltage … and where the device is operable in several periods within a frame (figures 5A-5F, …). Inukai further discloses that the first period has a first length and that during the first period a first current of a group of currents can be driven through the EL display element 109 ...). Inukai further discloses that the second period has a length different from the

first period (Figures 5A-5F) and that during the second period a second current of a plurality of currents is driven through the EL display element 109 … and that the first and second currents of the respective pluralities of drive currents can be selected independently or one another … Further Inukai discloses that the current levels, including a zero drive level, and that the duration of one period is approximately n times the duration of the other phase where n is the number of drive currents that can be used in the display (Figures 5A-5F …) Further Inukai discloses wherein during said first phase each of the pixel display elements is sequential driven for said first duration with a corresponding one of said first plurality of drive current and during said second phase each of the pixel display element sis sequential driven for said second duration with a corresponding one of said second plurality of drive currents associate with said second phase … However, Inukai fails to disclose more than two drive current levels and wherein the first plurality of drive current comprises a number n of drive current levels. … Hirane discloses more than two drive current levels or current volumes for a current driving method … Further Hirane discloses that the first plurality of drive currents comprises a number n of drive current levels (col. 4, lines 54-67; col. 7, lines 48-63; col. 8, lines 37-47; Figure 3, table 1).

In reply to Appellant's argument in response to the rejection of the claims in the Final Office Action, the Office responded, in the Advisory Action, that "[o]n page 9-10 of Applicant's remarks, Applicant argues that because Inukai doses not disclose that the number of current levels is related to the number of display periods, Inukai does not disclose the invention as claimed. The Examiner respectfully disagrees, because Inukai does disclose the relationship between the two values, namely that they are equal values.

The number of periods and the number of currents are directly related in that the periods during which current is applied creates the current used to display an image in the device. On page 10 of Applicant's remarks, Applicant argues that Inukai does not disclose more than two drive current levels because Inukai discloses only an ON and an OFF level. The Examiner respectfully disagrees, because Inukai disclose that the drive currents are created during the drive periods using the ON and OFF levels, and these drive currents are used to achieve the proper display in the device (col. 5, lines 49-64). (see AA, page 3).

Difference between the Claimed Invention Recited in the Independent Claims and the Cited References

The instant invention, as recited in claim 1, for example, which is typical of the remaining independent claims, recites

1. An electroluminescent (EL) display device comprising an array of display pixels, each display pixel comprising an EL display element and a current source circuit for driving a current through the EL display element in dependence on a data voltage, the display device being operable in at least a first and a second phase within each frame period,

the first phase having a first duration and during which a first one of a first plurality of drive currents can be driven through the EL display element, and

the second phase having a second duration, different to the first duration, and during which a second one of a second plurality of drive currents can be

driven through the EL display element, wherein the first and second ones of the respective pluralities of drive currents are independently selectable **and at least one of the first and second pluralities of drive currents include more than two drive current levels, and wherein the first plurality of drive currents comprises a number n of drive current levels,** including a zero drive level, and **wherein a duration of one phase is approximately n times a duration of the other phase,** wherein during said first phase each of the pixel display elements is sequential driven for said first duration with a corresponding one of said first plurality of drive currents and during said second phase each of the pixel display elements is sequential driven for said second duration with a corresponding one of said second plurality of drive currents associated with said second phase.

With reference to Figures 5A-5F, which are described in col. 3, lines 25-40, and as shown herein,

Fig. 5A

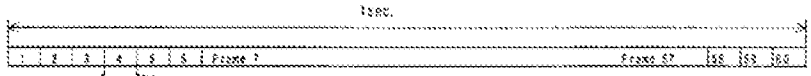


Fig. 5B

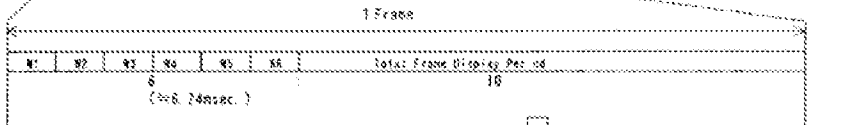


Fig. 5C

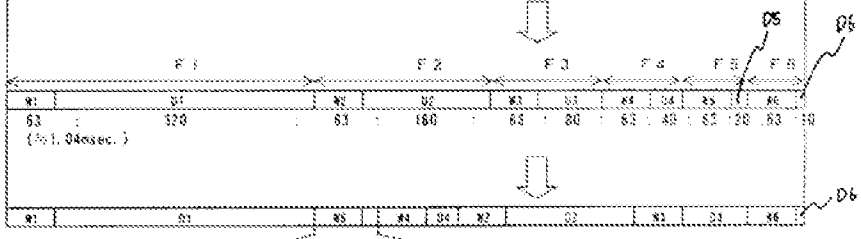


Fig. 5D

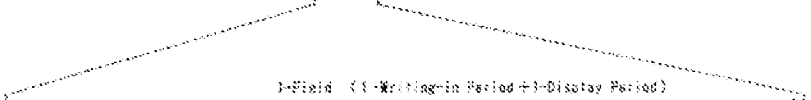


Fig. 5E

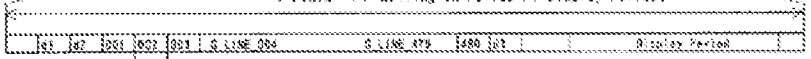
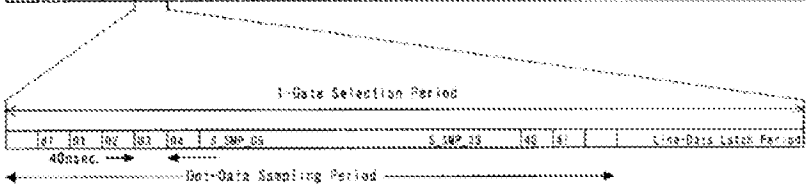


Fig. 5F



Inukai discloses a time division method for controlling a current to a display element wherein a frame is divided into a plurality of partitions (periods), which are further divided into a write-in period and a corresponding display period. The write-in period is essentially fixed (63 milliseconds) and the display periods are organized in a decreasing time relationship e.g., 1, ½, ¼, 1/8, 1/16, 1/32, etc. The length of time of each display period is based on the frame time adjusted by the fixed write-in time and **a desired number of display periods.** During each display period a current may be applied (i.e., ON state) or not applied (i.e. OFF state) such that over the frame the desired illumination may be achieved.

Thus, Inukai discloses a plurality of periods in which a current may be applied or not applied and the duration of the periods is a binary sub-multiple of a preceding period. That is, the duration of the display periods may be represented as $1/2^k$ where k=0, 1, 2, … N, wherein N is a gradation level.

Nowhere does Inukai disclose **that the duration of the display periods** are related to the number of current levels (n) (i.e., "… wherein the first plurality of drive currents comprises a number n of drive current levels, including a zero drive level, and wherein a duration of one phase is approximately n times a duration of the other phase…").

Thus, while Inukai discloses two current levels (i.e., On and Off) Inukai fails to disclose that there are two phases (periods) and that the duration of one phase is an n multiple of the other phase.

However, even if it could be said that the durations of the periods are multiples of each other (e.g., 1 is a 4 times multiple of ¼), as shown in Figure 5C, nowhere does Inukai disclose that the relationship among the durations of the phases (periods) represents **multiples based on the number of current levels, n,** as is recited in the claims.

In fact, even if it could be said that Inoue disclose two current levels, then the number of phases (periods) would be equal to two then the configuration of periods shown in Figures 5A-5F would be limited to two periods (i.e., a first display period and a second display period having a duration one-half (1/2) that of the first display period). .

However, Inukai discloses that Figures 5A-5F illustrate the case of 64 gradation, and it is possible that greater levels of gradation may be achieved by using more bits (i.e.,

"N bit (where N is an integer greater than or equal to 2) gradation display is performed (2^n gradations), then first one frame is divided into N fields … corresponding to the N bit gradations. The number of divisions of one frame increases with increasing gradations and the driver circuit must be driven with a high frequency." (see col. 5, lines 40-45)).

Thus, Inukai discloses that the number of display periods is based on a number N that is determined based on an available number of bits and a desired graduation level. Nowhere does Inukai disclose that the duration of the display periods (phases) is based on the number "n" (number of current levels), as is recited in the claims.

In referring to Hirane, the Office infers that the n drive current levels of Hirane may be incorporated into the teaching of Inukai as the two drive current levels (ON and OFF) of Inukai may be expanded to include the n current levels.

However, even if the n current levels of Hirane could be included into Inukai, nowhere is there any indication or suggestion that the duration of the display periods would be determined as $1/n^k$, where k=0, 1, 2… N.

In view of above, the Appellant respectfully submits that a *prima facie* case of obviousness has not been made. Inukai discloses a system where the number of display periods (phases) is determined based on a number of allowable bits (N) and the duration of each display period is a binary sub-multiple of a preceding display period. Nowhere does Inukai disclose the claim element "… wherein the first plurality of drive currents comprises a number n of drive current levels, including a zero drive level, and wherein a duration of one phase is approximately n times a duration of the other phase…").

Hence, even if the teachings of Inukai and Hirane were combined, the combination of the cited references would not include all the elements recited in the claims.

No Motivation Exists to Modify or Combine
the Teachings of the Cited References
to Arrive at the Present Invention

In order to establish a *prima facie* case of obviousness, generally three basic criteria must be met;

> 1. there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine the reference teachings;
>
> 2. there must be a reasonable expectation of success; and
>
> 3. the prior art reference must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must be found in the prior art, and not based on applicant's disclosure. *In re Vaeck* (citation omitted).(emphasis added).

In addressing obviousness determination under 35 USC §103, the Supreme Court in *KSR International v. Teleflex Inc.* (citation omitted) reaffirmed that "a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." (citation omitted). The Court stated that "it can be important to identify a reason that would have prompted a person …to combine the elements in the way the claimed new invention does … because inventions in most, if not all, instances rely upon building blocks long since uncovered,

and claimed discoveries almost of necessity will be combinations of what, in some sense is already known. (citation omitted). The Court further addressed the standard for obviousness that had been imposed in decisions rendered by the CAFC in that there must be some teaching, suggestion or motivation (TSM) to combine the known elements in the same manner set forth in the claims and found that the TSM to combine provides a "helpful hint" in determining whether claimed subject matter is obvious. The Court however stated that the application of the TSM test is not to be applied in a rigid manner. Rather, the Court favored a more expansive view of the sources of evidence that may be considered in determining an apparent reason to combine known elements. Hence, the Court upheld precedent that "when prior art references require a selected combination to render obvious, there must be some reason for the combination other than the hindsight gained from the invention itself, i.e., something in the prior art as a whole must suggest the desirability and, thus, the obviousness, of making the combination." *Uniroyal Inc. v. Rudkin-Wiley Corp*, (citation omitted).

Inukai and Hirane fails to provide any teaching regarding determining a phase (period) duration as a multiple of a number of current levels and explicitly teaches a number of display periods dependent upon a desired level of gradation and the duration of each display period is a binary sub-multiple of a preceding phase duration ($1/2^k$, k=0,1,2..N and N is a level of gradation).

Thus, contrary to the assertions made in maintaining the rejection of the claims, Appellant submits that the combination of the cited references fails to disclose a material element recited in the claims.

In addition, in addressing the obviousness rejection under 35 USC §103, the *KSR* Court did not diminish the requirement of objective evidence of obviousness. Rejections on the grounds of obviousness cannot be sustained by mere conclusory statements as there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.

In this case, the Office has selected elements from different prior art references to find elements recited in the claims. However, other than the conclusory statement that it would be obvious to incorporate the teaching of the cited references, the Office has failed to provide any motivation to show that the modification of the Inukai by the teachings of Hirane would include a duration of a phase that is based on a number of current levels in another phase. That is, the combination of the references would not result in display periods having durations that may be determined as $1/n^k$, wherein k=0, 1, 2, … N and N is a desired level of gradation.

Accordingly, with regard to the subject matter recited in each of the independent claims, Appellant respectfully submits that pursuant to an expansive interpretation of the three basic criteria necessary to show obviousness, a *prima facie* case of obviousness has not been set forth because the combination of the cited references has been impermissibly selected using the teachings of the instant application as a blueprint without any suggestion or reason for such combination.

The Manual of Patent Examining Procedure (MPEP) provides further appropriate instruction by which the instant Appeal should be judged. MPEP, Eight Edition, Rev. 2, May 2004, provides in section 2143 entitled: "Fact That The Claimed Invention Is Within

The Capabilities Of One Of Ordinary Skill In The Art Is Not Sufficient By Itself To Establish *PRIMA FACIE* Obviousness:"

> "A statement that modification of the prior art to meet the claimed invention would have been "'well within the ordinary skill of the art at the time the claimed invention was made'" because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a prima facie case of obviousness without some objective reason to combine the teachings of the references." *Ex parte Levengood* 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993). MPEP §2143.01, p. 2100-131.

Appellant respectfully submits that the Office has failed to show the combination of the cited references discloses all the elements recited in the claims.

For at least the above reasons, Appellant respectfully submits that a case of obviousness has not been set forth.

With regard to the remaining claims, these claims depend from the independent claims and Appellant respectfully submits that these claims are also not rendered unpatentable at least for their dependence upon allowable base claims, without contemplating the merits of the rejection of the dependent claims for reasons held in *In re Fine,* (citation omitted) (if an independent claim is non-obvious under 35 U.S.C. §103(a), then any claim depending therefrom is non-obvious).

In view of the above, Appellant submits that the independent claims and the claims dependent therefrom are patently distinguishable and not rendered obvious over the teaching of the cited references.

II. Rejection of claim 7 under 35 USC §103

The rejection of claim 7 as being rendered obvious and unpatentable under 35 USC §103(a) by the combination of Inukai in view of Hirane and further in view of Hack is in error because the combination of the references fails to disclose a material element recited therein.

Claim 7 incorporates the subject matter of claim 1, which has been shown to include subject matter not disclosed by the combination of Inukai and Hirane. Hack fails to provide any teaching that would correct the deficiency found to exist in the combination of Inukai and Hirane.

Accordingly, the subject matter recited in claim 7 is patently distinguishable and not rendered obvious over the teachings of the cited references.

VIII. CONCLUSION

In view of the above analysis, it is respectfully submitted that the referenced teachings, whether taken individually or in combination, fail to render obvious the subject matter of any of the present claims. Therefore, reversal of all outstanding grounds of rejection is respectfully solicited.

Respectfully submitted,

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IX. CLAIMS APPENDIX

1. An electroluminescent (EL) display device comprising an array of display pixels, each display pixel comprising an EL display element and a current source circuit for driving a current through the EL display element in dependence on a data voltage, the display device being operable in at least a first and a second phase within each frame period,

the first phase having a first duration and during which a first one of a first plurality of drive currents can be driven through the EL display element, and

the second phase having a second duration, different to the first duration, and during which a second one of a second plurality of drive currents can be driven through the EL display element, wherein the first and second ones of the respective pluralities of drive currents are independently selectable and at least one of the first and second pluralities of drive currents include more than two drive current levels, and wherein the first plurality of drive currents comprises a number n of drive current levels, including a zero drive level, and wherein a duration of one phase is approximately n times a duration of the other phase, wherein during said first phase each of the pixel display elements is sequential driven for said first duration with a corresponding one of said first plurality of drive currents and during said second phase each of the pixel display elements is sequential driven for said second duration with a corresponding one of said second plurality of drive currents associated with said second phase.

2. (Canceled)

3. A device as claimed in claim 1, wherein n is 8.

4. A device as claimed in claim 1, wherein the first plurality of drive currents is the same as the second plurality of drive currents.

5. A device as claimed in claim 1, wherein the first plurality of drive currents comprises a first number n of drive current levels for providing the lowest n non-zero brightness levels, and the second plurality of drive currents comprises a second number m of non-zero drive current levels for providing the highest m brightness levels, where n+m is the total number of brightness levels.

6. A device as claimed in claim 1, wherein each pixel comprises a drive transistor, a storage capacitor for storing a gate voltage of the drive transistor and an address transistor for switching a data voltage to the gate of the drive transistor during an addressing phase.

7. A portable electronic device comprising a display device as claimed in claim 1.

8. A method of driving an electroluminescent (EL) display device comprising an array of display pixels, each display pixel comprising an EL display element and a current source circuit for driving a current through the EL display voltage in dependence on a data voltage, the method comprising the acts of:

in a first phase having a first duration, sequentially driving each of said display pixels with a corresponding one of a first plurality of drive currents for said first duration; and

in a second phase having a second duration, different to the first duration, sequentially driving each of said display pixels with a corresponding one of a second plurality of drive currents for said second duration, wherein the first and second ones of the plurality of drive currents are selected to provide a desired combined EL display element output, and at least one of the first and second pluralities of drive currents includes more than two drive current levels, and wherein the plurality of drive currents comprises a number n of drive levels, and wherein a duration of one phase is approximately n times a duration of the other phase.

9. (Canceled)

10. A method as claimed in claim 8, wherein n is 8.

11. A method as claimed in claim 8, wherein the first plurality of drive currents is the same as the second plurality of drive currents.

12. A method as claimed in claim 8, wherein the first plurality of drive currents comprises a first number n of non-zero drive current levels for providing the lowest n brightness levels excluding zero, and the second plurality of drive currents comprises a second number m of non-zero drive current levels for providing the highest m brightness levels, where n+m is the total number of non-zero brightness levels.

13. A device as claimed in claim 1, wherein the first plurality of drive currents is the same as the second plurality of drive currents.

14. A device as claimed in claim 1, wherein each pixel comprises a drive transistor, a storage capacitor for storing a gate voltage of the drive transistor and an address transistor for switching a data voltage to the gate of the drive transistor during an addressing phase.

15. The EL display device of claim 1, wherein only the first phase is used to provide lowest n brightness levels.

16. The EL display device of claim 15, wherein only the second phase is used to

provide brightness levels higher than the lowest n brightness levels.

17. The EL display device of claim 1, wherein the first phase is used for higher resolution and the second phase is used for lower resolution.

18. The EL display device of claim 1, wherein a highest brightness level is provided by turning off drive currents during the first phase, and increasing a peak drive current in the second phase to a higher level than an allowable peak drive current in the first phase.

19. The EL display device of claim 1, wherein all the display pixels are addressed twice within each frame period.

20. The EL display device of claim 1, wherein all the display pixels are addressed once row by row during the first phase, and are re-addressed in a same row by row order during the second phase.

21. The method of claim 8, further comprising the acts of:

using only the first phase to provide lowest n brightness levels; and

using only the second phase to provide brightness levels higher than the lowest n

brightness levels.

22. The method of claim 21, further comprising the act of providing a highest brightness level by turning off drive currents during the first phase, and increasing a peak drive current in the second phase to a higher level than an allowable peak drive current in the first phase.

X. EVIDENCE APPENDIX

No further evidence is submitted herein.

XI. RELATED PROCEEDING APPENDIX

No related proceedings are pending and, hence, no information regarding same is available